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This newly designed pen assembly is a direct replacement for the pen assembly originally used in the [ ] Recorder. The two pens are identical in appearance, however there has been an important improvement made internally. The original pen has a small brass screw located on the top front surface of the pen tank, which is part of a broach-like pen tip cleaning device. A similar screw on the new pen is part of an ink filter device.

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The replacement pens are shipped full of ink and have the filter screw properly adjusted. Filter installation, pen cleaning, and adjustment are described below:

STAT With proper use the [ ] pen assembly will not normally require extensive maintenance. However, the following procedure is used to troubleshoot a pen that skips badly or fails to write. It is assumed the pen is positioned and seated correctly in the carriage. See Pen Installation and Removal in Operating Instructions.

1. Be certain pen is hot. If pen tank is not hot remove and check resistance. Heater element resistance at room temperature is 21 ohms.

2. Visually inspect or use cap vent tube as a dip stick to check ink supply. (Figure 1)

STAT CAUTION: Use only [ ] engineered Solid State Ink, Model 11-2763-01.

3. If unmelted wax or foreign material obstructs vent tube use fine wire to clean out air vent tube.

4. To remove foreign matter lodged in pen writing tip, follow the procedure described below:

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a. Turn MODE switch to WRITE position. Set CHART SPEED switch at 2" per minute and ZERO TEST switch to the left, or ZERO TEST position. When pen tank is hot, raise writing end on front of tank approximately 1/4 inch off writing bar and chart paper.

b. Place any object which has a diameter of approximately 1/8 inch (pencil tip, small screw driver, etc.,) against paper and under either front corner of pen tank.

c. Flick pen tank several times so that it strikes sharply against 1/8 inch diameter object.

CAUTION: Be certain writing tip does not touch paper as pen tank is flicked.

Normally several drops of ink will be expelled through pen tip, thus clearing pen.

5. In an extreme case where the above procedure does not remove obstruction, it will be necessary to disassemble pen.

a. Be sure pen tank is hot, then remove it from pen carriage as described in pen removal section.

b. Carefully remove small brass screw located on top and at the front of pen tank. Attached to the end of this screw is a small spring which acts as a filter.

c. Remove vent tube cap and discard ink. (Figure 2)

d. Carefully clean pen tank filter and vent tube cap and tank in chlorothene or trichloroethylene.

e. Hold pen up toward the light and see if pen tip is unclogged.

f. If pen tip remains clogged, insert an .008 inch diameter music wire from top side of pen tank then, gently push through pen tip.

g. Insert filter in pen tank and gently tighten brass screw until it bottoms. This will completely compress the spring and the screw head will be just below surface of pen tank.

h. Back off brass screw one-half turn.

i. Refill pen with ink as described in pen refilling instructions.

CAUTION: Do not allow pen to move across chart paper or chart paper to move under pen unless ink is flowing from pen tip. Take care not to run out of ink while unit is writing.

6. Check ink temperature indirectly by reading voltage applied across pen. Set control in the INCHES PER HOUR position and in the WRITE mode. Allow temperature to stabilize for approximately 10 minutes. The reading across pen should be between 9.5 to 10.5 volts D.C. Adjust if necessary, using control R6 in power amplifier unit A50142. Pen voltage will then read from 11.5-12.5 volts in the INCHES PER MIN position.

NOTE: Adjust pen heat control only when in the INCHES PER HOUR position. After adjustment allow at least 5 minutes for unit to stabilize then readjust voltage, if necessary.

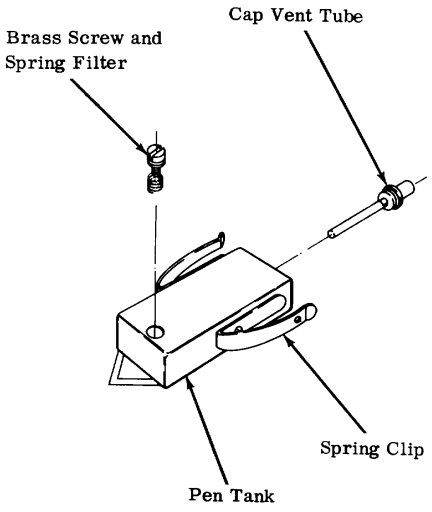


Figure 1

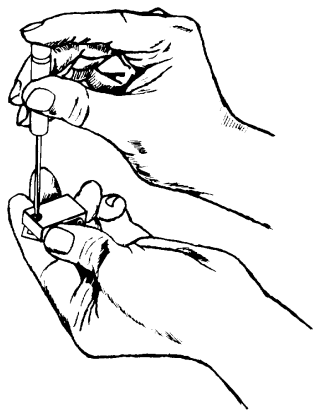
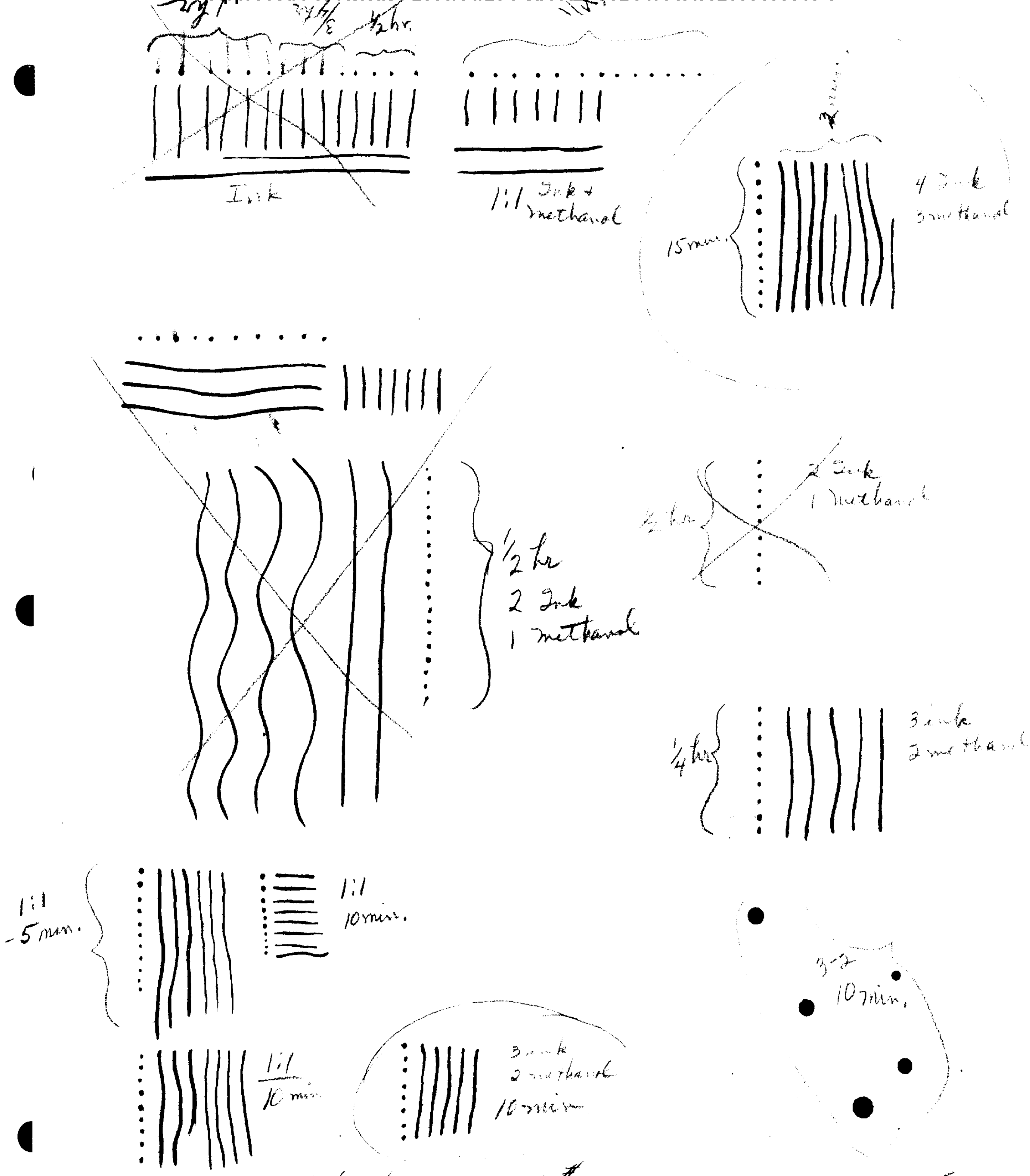


Figure 2



Grush Kellograph Ink #KH 2166
mixed w/ methanol ~ 3:2 or 4:3 appears best
1:1 too light